



The St. George and Sutherland Hospitals
Departments of Renal Medicine/Nutrition and Dietetics

Nutrition Protocols for the Management of People with Kidney Disease

**This document is developed by the Departments of
Renal Medicine and Nutrition and Dietetics
The St George and Sutherland Hospitals, NSW**

These protocols are only intended to provide general guidelines for the dietary management of patients with Chronic Kidney Disease. Each patient will receive an individualised diet prescription and education by the dietitian

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A Abbreviations Used

Abbreviations	Term
BMI	Body Mass Index
CARI	Caring for Australasians with Renal Impairment (guidelines)
CKD	Chronic Kidney Disease
CHO	Carbohydrate
/d	per day
g	gram
GFR	Glomerular Filtration Rate
HD	Haemodialysis
CVVHD	Continuous venovenous hemodialysis
HBV	High Biological Value
IBW	Ideal body weight (for height)
IDPN	Intradialytic Parenteral Nutrition
KDOQI	Kidney Disease Outcomes Quality Initiative (NKF KDOQI)
Kg	Kilogram
M	Meter
mg	milligram
KPIs	Key Performance Indicators
MO	Medical officer
NODAT	New onset diabetes after transplantation
nPCR	normalised Protein Catabolic Rate
PEW	Protein-energy wasting
PD	Peritoneal dialysis
APD	Automated peritoneal dialysis or known as continuous cycling peritoneal dialysis (CCPD)
CAPD	Continuous ambulatory peritoneal dialysis
IPD	Intermittent peritoneal dialysis
RDI	Recommended daily intake (for healthy Australian)
RN	Registered nurse
SGA	Subjective Global Assessment
TNC	Terminal Nursing Care
UO	Urine Output
URR	Urea Reduction Ratio

B Nutritional Goals for Renal Disease Management

Common Goal

These goals are applicable for all stages of chronic kidney disease including dialysis and transplantation:

- To attain and maintain optimal nutritional status.
(This includes general good nutrition with optimal energy, a balanced diet with all essential nutrients and food groups)
- To attain and maintain ideal body weight (IBW) for height and lean body mass (LBM)
- To prevent malnutrition and undesirable loss of body weight
- Control of uraemia and related symptoms
- Maintain fluid and electrolyte balance, e.g. sodium and potassium
- Control of hypertension
- Control of lipid abnormalities
- Control of hyperphosphatemia or hypophosphatemia
- Optimal glycaemic control (in patients with diabetes)
- To reduce modifiable risk factors relating to cardiovascular events
- To encourage regular exercise and physical activities

Additional specific goal:

- Non-dialysed CKD:
 - In general:
 - To preserve renal function and to delay the progression of kidney disease or fall of GFR
 - To delay onset of symptoms
 - CKD and pre-dialysis (patients planning for future dialysis program), aim for:
 - a healthy start of dialysis with good nutritional status
 - delay commencement of dialysis through vigorous control of blood pressure, complications, nutritional status and symptoms
 - Conservative care: aim to improve quality and quantity of life.
- Transplantation: to prevent complications e.g. foodborne infection, unintentional weight gain and to preserve renal function etc.

C Guidelines and Policy for Referrals

1. Outpatients:

- a) From nephrologists and multi-disciplinary renal team of SGH and TSH ONLY, (i.e. no direct referral from LMO):

Referral is required to initiate dietary intervention for the following treatments:

- CKD stages 3b-5 including non-dialysis CKD and conservative management
 - Complications associated with kidney failure e.g. sodium and fluid management, electrolytes imbalance and malnutrition etc.
 - Renal calculi/metabolic disorders
- see section 3 re common reasons for referral

REMARK:

In view of limited renal dietitian staffing, please refer management of CKD stages 1-3a, general hypertension, lipid lowering, diabetes and obesity to local medical officer (LMO) and community / private practice dietitian for Chronic Disease Management Scheme, General Practice Services, Department of Health, Australian Government.
<http://www.health.gov.au/internet/main/publishing.nsf/Content/mbsprimarycare-chronicdiseasemanagement>

- b) Blanket Referral

Once the dietitian is informed, all patients are intervened as per protocol:

- Pre-dialysis assessment clinic
- Renal supportive care clinic (to commence services ~ August 2015)
- Dialysis: Haemodialysis and Peritoneal Dialysis (CAPD, APD and IPD)
- Transplantation

2. Inpatients

- a) Patients admitted under renal team:

- Blanket referral:
 - all dialysis and acute transplant patients
 - non-dialysed CKD patients who have previous nutrition intervention
- Other referrals e.g. new CKD including conservative care patients, failing transplant and new dietary issues raised e.g. NODAT

- b) Others:

- Critical care e.g. ICU are to be seen by the critical care unit dietitian
- Renal consults: patients are referred to the dietitian under the respective medical or surgical teams

3. Common reasons for referral:

(extracted from referral form)

<ul style="list-style-type: none">• Nutrition intervention as per clinical practice guidelines for the respective stage of CKD and treatment modality	<ul style="list-style-type: none">• Volume overload (Na restriction and fluid control)
<ul style="list-style-type: none">• Malnutrition or at risk of	<ul style="list-style-type: none">• Hypertension
<ul style="list-style-type: none">• Unintentional loss of weight	<ul style="list-style-type: none">• Hyperkalaemia or Hypokalaemia
<ul style="list-style-type: none">• Overweight/Obesity/Uncontrolled weight gain	<ul style="list-style-type: none">• Hyperphosphatemia or Hypophosphatemia
<ul style="list-style-type: none">• Poor appetite, reduced intake & early satiety	<ul style="list-style-type: none">• Hyperlipidaemia
<ul style="list-style-type: none">• Symptom control (e.g. nausea, taste aversion)	<ul style="list-style-type: none">• Food texture: chewing/ swallowing problems
<ul style="list-style-type: none">• Diabetes (type I or Type II) including NODAT	<ul style="list-style-type: none">• Change of social situation affecting intake, e.g. nursing home placement, loss of income etc.

D Recommendation of other nutrition related issues

1. Vitamin and Mineral Supplements

All vitamins and minerals are to be prescribed by the MOs. The recommended levels of supplementation are described in Section E. In special conditions which alter the vitamin and mineral requirements, e.g. poor oral intake, wound healing, burns, malabsorption, pregnancy etc., the dietitian should liaise with the MOs re prescribing the appropriate supplements.

2. Medication Used

a. Phosphate binders:

Patients are to be educated to control their phosphorus intake (if applicable) and to take the phosphate binders as prescribed by their MO. After the assessment, if any extra phosphate binders are required for larger portion of diet/food required and/or in-between meal snacks and fluids, the dietitian should liaise with the respective MO to adjust the dosage and timing of the binders used.

b Oral hypoglycaemic agents (OHAs) and insulin:

Adjusting OHAs or insulin dosage may be required when incorporating renal and diabetic diet therapy, for example inclusion of simple carbohydrate may be required for diabetic patients to meet their energy requirements. The dietitian should liaise with the MO re adjusting their OHAs or insulin accordingly.

E Dietary protocols for the management of people with renal disease

1 Hypertension (general)

Referral: Please refer to LMO and dietitian in the community

Remarks: The guidelines below are applicable to people with or without renal impairment. However, dietary prescription must be adjusted according to the individual's conditions, e.g. hyperkalaemia, hypophosphatemia and diabetes etc.

Dietary Protocol:

In General	Healthy eating as per recommendations of : <ul style="list-style-type: none">• Dietary Approaches to Stop Hypertension (DASH) diet• Mediterranean-style eating pattern• Australian Dietary Guidelines for healthy adults
Energy	Aim to attain and maintain IBW <ul style="list-style-type: none">• Overweight patients need weight reduction to aid blood pressure control• Underweight and malnourished patients may need to gain weight
Sodium	No added salt diet, 80-100 mmol/d Na ⁺
Alcohol	No more than 2 standard drinks per day or advised by MO.
Increased Consumption of	Fruit, vegetables, nuts and low fat dairy products for increased intake of potassium, magnesium, calcium and dietary fibre.
Moderate Consumption of	Protein foods
Inclusion of	Mono- and poly- unsaturated fats
Decreased Consumption of	Saturated fats

Key Reference:

1. Appel, L.J. et.al. A Clinical trial of the effects of dietary patterns on blood pressure, DASH Collaborative Research Group. N. Engl J. Med. 1997:336.1117-1124.
<http://www.nejm.org/doi/full/10.1056/NEJM199704173361601>
2. Australian Dietary Guidelines, NM&MRC 2013: <https://www.nhmrc.gov.au/guidelines-publications/n55> and summary: https://www.nhmrc.gov.au/files_nhmrc/publications/attachments/n55a_australian_dietary_guidelines_summary_131014.pdf

2 CKD stages 1-3

Referral: Please refer to LMO and dietitian in the community (CKD stages 1-3a)

Dietary Protocol:

In General	CARI guidelines for chronic kidney disease (CKD) stages 1-3 and Healthy eating as per Australian Dietary Guidelines
Protein:	0.75-1.0g/Kg IBW /d (Australian RDI)
Energy	Aim to attain and maintain IBW Depending on physical activity level: 35-45 Kcal (150-190KJ)/kg IBW/d for <60 years 30-35 Kcal (130-150KJ)/kg IBW/d for >60 years <ul style="list-style-type: none">• energy from CHO approximately 50-60%• energy from Fat approximately 30-35%. Adapted to individual needs in case of under-nutrition or overweight/obesity
Sodium	If hypertension or oedema present: Approximately 80mmol/d (no added salt) <ul style="list-style-type: none">• May need lower sodium intake if severe oedema present• May need higher sodium intake in patients with salt-losing nephropathy
Fats	<ul style="list-style-type: none">• Encouraged Mono- and poly- unsaturated fats• Saturated fat <10% of energy• Cholesterol <300mg/d
Alcohol	No more than 2 standard drinks per day or advised by MO.
Dietary Pattern	Regular inclusion of fruit and vegetables, and dietary fiber

Key reference:

1. Modification of lifestyle and nutrition interventions for management of early chronic kidney disease
http://www.cari.org.au/CKD/CKD%20early/Modification_of_Lifestyle_Nutrition_ECKD.pdf
2. KHA-CARI Guideline: Early chronic kidney disease: Detection, prevention and management
http://www.cari.org.au/CKD/CKD%20early/Summaries/Johnson_2013_340.pdf
3. Australian Dietary Guidelines, NM&MRC 2013: <https://www.nhmrc.gov.au/guidelines-publications/n55> and summary: https://www.nhmrc.gov.au/files_nhmrc/publications/attachments/n55a_australian_dietary_guidelines_summary_131014.pdf

3. CKD Stages 4-5 (non- dialysed), including pre-dialysis and conservative care

Referral: Medical Officer or team referral required
Blanket referral form Pre-dialysis assessment clinic & renal supportive care services

Dietary Protocol:

In General	as per clinical practice guidelines and a balanced diet
Protein	Approximately 0.75-1.0g /kg IBW/d (Australian RDI) Approximately 70% HBV protein <u>Remark:</u> <ul style="list-style-type: none"> • ~ 0.6g/kg IBW/d (and no less) for patients with severe symptoms (usually applicable to patients in advance stage of conservative care) • For nutrition support or repletion ~ 1.0g /kg IBW/d • A high protein diet for nutrition support in malnourished patients, or weight reduction in overweight/obese patients is inappropriate
Energy	Aim to attain and maintain IBW Depending on physical activity level 35-45 Kcal (150-190KJ)/kg IBW/d for <60 years 30-35 Kcal (130-150KJ)/kg IBW/d for >60 years <ul style="list-style-type: none"> • energy from CHO approximately 50-60% • energy from Fat approximately 30-35%. Adapted to individual needs in case of under-nutrition or overweight/obesity
Sodium	If hypertension or oedema present: Approximately 80mmol/d (no added salt) <ul style="list-style-type: none"> • May need lower sodium intake if severe oedema present, e.g. 50mmol/d • May need higher sodium intake in patients with salt-losing nephropathy
Potassium	No restriction unless hyperkalaemia present 40-70mmol/d if restriction required
Phosphorus	<1000mg/d if hyperphosphatemia present + phosphate binders
Fat	<ul style="list-style-type: none"> • Encouraged Mono- and poly- unsaturated fats • Saturated fat <10% of energy • Cholesterol <300mg/d
Alcohol	No more than 2 standard drinks per day or advised by MO
Vitamins & Minerals (diet)	near RDI levels
Vitamins & Minerals (supplementation)	May need individualised calcium, iron and vitamin D supplementation. May need supplementation of Vitamin B complex, Vitamin C and folate acid near RDI levels if protein intake is <60g/day
Fluid	UO + 500ml/d, depending on balance
Dietary Pattern	Regular inclusion of fruit and vegetables, and dietary fiber

CKD Stages 4-5 (non- dialysed), including pre-dialysis and conservative care (continued)

Recommended intervention

- Outpatient (minimum):
 - Stable CKD and pre-dialysis patients:
 - Initial appointment ~ 2 hours, then review every 1–3 months, and more frequently if clinically indicated. Then 6 monthly in stable patients (minimum 4 hours per annum).
 - Follow up until dialysis commences
- Conservative pathway:
 - Initial appointment ~ 2 hours, then review every 1–3 months, and more frequently if clinically indicated. Then 6 monthly in stable patients (minimum 6 hours per annum).
 - follow up until withdrawing from treatment or for TNC
- Inpatient (in addition to usual nutrition care):
 - Screening for undernutrition should be performed weekly
 - Screening may need to occur more frequently if risk of undernutrition is increased (for example by intercurrent illness)

Notes for “Comfort feeding”:

“Comfort feeding” should be implemented upon the request by MO, then educate patient and caregiver to make “informed decision”, and to document in medical notes. Recommendation:

Stages of CKD	Conservative care	*Shortly before end of life care	*End of life or Terminal nursing care
eGFR or patient type	Could be as early as 20-25 ml/min when patients are assessed in pre-dialysis assessment clinic or as referred to the CKD nutrition clinic	<ul style="list-style-type: none"> • Late stages of conservative care , GFR typically < < 10ml/min or depending on the severity of symptoms • After withdrawing dialysis 	
Nutrition intervention	As per clinical practice guidelines	Comfort feeding, diet as desired	Comfort feeding, diet as desired
Goals	As per CKD stages 4-5, page 4	Palliative care	Palliative care

* Adapted to individual needs and wishes

KPIs:

- Percentage of patients assessed by a renal dietitian (including SGA) within the last 12 months
- Percentage of the referred patients assessed by a renal dietitian (including SGA) within the last 12 months
- Percentage of well-nourished patients with an SGA score of A or 6-7 on a 7-point scale
- Whichever is applicable, maintenance (well nourished) or improvement (from malnourished category, SGA B or C) of nutrition status in the referred patients
- Weight loss, improvement in diet quality and exercise level in patients requiring weight control

Key reference:

1. Evidence based practice guidelines for the nutritional management of chronic kidney disease. Nutrition & Dietetics, 2006; 63 (Suppl. 2):S35–S45.
<\\sesahs\chn\STG\Medicine and Emergency\Renal\RISCDOC\Nutrition and Dietetics\Guidelines & Protocols\CKD Nutrition guidelines stages 3-5 & Dx.pdf>
2. Nutrition in Chronic Renal Failure, Kidney Disease Outcomes Quality Initiative (NKF KDOQI)
<https://www.kidney.org/sites/default/files/docs/kdoqi2000nutritiongl.pdf>

4 Nephrotic Syndrome

Referral: Medical Officer referral required

Dietary Protocol:

In General	Goals of management are similar to in Dietary Management to CKD stages 1-5 (non-dialyzed), plus special emphases on: <ul style="list-style-type: none"> • Control of proteinuria • Control of fluid balance • Control of lipid abnormalities
Protein	Depends on the degree of renal function, usually no dietary protein modification required. If dietary protein modification is required: 0.8-1.0g/kg IBW/d + g to g replacement approximately 70% HBV protein <u>Remark</u> – high protein diet as recommended in the past is no longer considered beneficial as diets rich in protein increase proteinuria
Energy	Aim to attain and maintain IBW Depending on physical activity level 35-45 Kcal (150-190KJ)/kg IBW/d for <60 years 30-35 Kcal (130-150KJ)/kg IBW/d for >60 years <ul style="list-style-type: none"> • energy from CHO approximately 50-60% • energy from Fat approximately 30-35%. Patients on steroid therapy may need to control body weight. Adapted to individual needs in case of under-nutrition or overweight/obesity
Sodium	If hypertension or oedema present: Approximately 80mmol/d (no added salt) <ul style="list-style-type: none"> • May need lower sodium intake if severe oedema present • ~ 50mmol/d (low sodium) - if severe oedema present
Calcium	Patients on steroid therapy require adequate calcium intake, >RDI i.e. 800-1000mg/d
Phosphorus	<1000mg/d if hyperphosphataemia present + phosphate binders
Fat	<ul style="list-style-type: none"> • Encouraged Mono- and poly- unsaturated fats • Saturated fat <10% of energy • Cholesterol <300mg/d
Alcohol	No more than 2 standard drinks per day or advised by MO.
Fluid	Restriction as documented by MO

Key reference:

Nutritional and non-nutritional management of the nephrotic syndrome, Chapter 26, Textbook of Nutritional Management of Renal Disease. Third Edition 2013

5 Haemodialysis (HD)

Referral: Blanket referral

Dietary Protocol:

In General	as per clinical practice guidelines and a balanced diet
Protein	1.2 (-1.4g/kg) IBW/d (depending on type of dialyser used) Approximately 60-70% HBV protein Higher requirements for malnourished patient (~1.5g/kg IBW/d) To aim: <ul style="list-style-type: none"> • nPCR ~1.1-1.2g/kg IBW/d • URR ~ 65% • pre-dialysis urea ~20-25 mmol/l
Energy	Aim to attain and maintain IBW Depending on physical activity level 35-45 Kcal (150-190KJ)/kg IBW/d for <60 years 30-35 Kcal (130-150KJ)/kg IBW/d for >60 years <ul style="list-style-type: none"> • energy from CHO approximately 50-60% • energy from Fat approximately 30-35% Adapted to individual needs in case of under-nutrition or overweight/obesity
Sodium	~ 80mmol/d (no added salt)
Potassium	Restricted if hyperkalaemia present 40-70mmol/d
Phosphorus	<1000mg/d + phosphate binders Aims: <ul style="list-style-type: none"> • predialysis serum phosphate level of 0.8–1.60 mmol/L • serum calcium (albumin-corrected) x phosphate product < 4.0 mmol/L
Fat	<ul style="list-style-type: none"> • Encouraged Mono- and poly- unsaturated fats • Saturated fats <10% of energy • Cholesterol <300mg/d
Alcohol	No more than 2 standard drinks per day or advised by MO.
Other Vitamins & Minerals (intake)	near RDI levels
Vitamins & Minerals (supplementation)	<ul style="list-style-type: none"> • Vitamin B complex and Vitamin C and folic acid near the RDI levels • Individualised Vitamin D, Iron and Calcium supplement by MO
Fluid:	UO + previous day losses + 500ml/d, depending on balance Aim <0.5kg/d fluid gain, ie. <2-2.5kg interdialytic fluid gain

Remark: patients on nocturnal haemodialysis or any slower, longer hemodialysis treatments usually have better control of potassium, phosphorous and fluids. Therefore, patients may require less dietary potassium, phosphorous and fluids restriction. However, healthier appetite is common in these patients; therefore optimal energy (calorie) intake and regular exercise are encouraged to prevent undesirable weight gain.

Haemodialysis (continued)

Recommended intervention:

- Outpatient/ day-stay services (minimum):
 - Initial appointment ~ 2 hours, then review every 1–3 months, and more frequently if clinically indicated. Then 6 monthly in stable patients (minimum 4 hours per annum)
- Inpatient (in addition to usual nutrition care):
 - Screening for undernutrition should be performed weekly
 - Screening may need to occur more frequently if risk of undernutrition is increased (e.g. intercurrent illness)

KPIs:

- Percentage of dialysis patients assessed by a renal dietitian (including SGA) within the last 6 months
- Percentage of dialysis patients with an SGA score of A or 6-7 on a 7-point scale (well nourished)
- Whichever is applicable, maintenance (well nourished) or improvement (from malnourished category, SGA B or C) of nutrition status in the treated patients

Key reference:

1. Evidence based practice guidelines for the nutritional management of chronic kidney disease. Nutrition & Dietetics, 2006; 63 (Suppl. 2):S35–S45.
<\\sesahs\chn\STG\Medicine and Emergency\Renal\RISCDOC\Nutrition and Dietetics\Guidelines & Protocols\CKD Nutrition guidelines stages 3-5 & Dx.pdf>
2. Nutrition in Chronic Renal Failure, Kidney Disease Outcomes Quality Initiative (NKF KDOQI)
<https://www.kidney.org/sites/default/files/docs/kdoqi2000nutritiongl.pdf>

6 Peritoneal Dialysis (PD)

Referral: Blanket referral

Dietary Protocol:

In General	as per clinical practice guidelines and a balanced diet
Protein	<p>~ 1.3g/kg IBW/d Approximately 60-70% HBV Maintenance – 1.2g/kg IBW/d Repletion or peritonitis ~ 1.5g/kg IBW/d To aim serum urea ~20 mmol/l nPCR ~1.2g-1.5g/kg IBW/d</p>
Energy	<p>Aim to attain and maintain IBW Depending on physical activity level Adapted to individual needs in case of under-nutrition or overweight/obesity <u>Total from diet + dialysate:</u> 35-45 Kcal (150-190KJ)/kg IBW/d for <60 years 30-35 Kcal (130-150KJ)/kg IBW/d for >60 years</p> <ul style="list-style-type: none"> • energy from CHO approximately 50-60% • energy from Fat approximately 30-35%. <p><u>Remark:</u> On average, glucose absorption from dialysate provides ~300 - 500kcal/day (depending on the glucose concentration) Therefore, recommended <u>oral prescription</u> should be a subtraction of 300-500kcal/d from the above calculations <u>OR</u> 30-40kcal (120-150KJ)/kg IBW/d for <60 years 25-30kcal (100-130KJ)/kg IBW/d for >60 years Weight control may be required in view of high absorption of glucose</p>
Sodium	~ 80mmol/d (no added salt)
Potassium	<ul style="list-style-type: none"> • Restricted if hyperkalaemia present, 40-70mmol/d • High potassium diet if hypokalaemia present. <p><u>Remarks:</u></p> <ul style="list-style-type: none"> • clearance of potassium in <u>CAPD</u> is usually good and potassium restriction is not usually required • clearance of potassium in <u>APD</u> varies among individuals, may need to control potassium intake (higher or lower) accordingly •
Phosphorus	<p><1200mg/d + phosphate binders Aim:</p> <ul style="list-style-type: none"> • Pre-dialysis serum phosphate level of 0.8–1.60 mmol/L • serum calcium (albumin-corrected) x phosphate product < 4.0 mmol/L •
Fat	<ul style="list-style-type: none"> • Encouraged Mono- and poly- unsaturated fats • Saturated fats <10% of energy • Cholesterol <300mg/d

Dietary Protocols (continued)

Alcohol	No more than 2 standard drinks per day or advised by MO
Other Vitamins & Minerals (intake)	near RDI levels
Vitamins & Minerals (supplementation)	<ul style="list-style-type: none">• Vitamin B complex and Vitamin C and folic acid near the RDI levels• Individualised Vitamin D, Iron and Calcium supplement by MO
Fluid:	Depending on balance, usually 1,000-1,500ml/d

Remark: dietary management for **IPD**, treated as for hemodialysis

Recommended intervention:

- Outpatient (minimum):
 - Initial appointment ~ 2 hours, then review every 1–3 months, and more frequently if clinically indicated. Then 6 monthly in stable patients (minimum 4 hours per annum)
- Inpatient (in addition to usual nutrition care):
 - Screening for undernutrition should be performed weekly
 - Screening may need to occur more frequently if risk of undernutrition is increased (e.g. intercurrent illness)

KPIs:

- Percentage of dialysis patients assessed by a renal dietitian (including SGA) within the last 6 months
- Percentage of dialysis patients with an SGA score of A or 6-7 on a 7-point scale (well nourished)
- Whichever is applicable, maintenance (well nourished) or improvement (from malnourished category, SGA B or C) of nutrition status in the treated patients

Key reference:

1. Evidence based practice guidelines for the nutritional management of chronic kidney disease. Nutrition & Dietetics, 2006; 63 (Suppl. 2):S35–S45.
<\\sesahs\chn\STG\Medicine and Emergency\Renal\RISCDOC\Nutrition and Dietetics\Guidelines & Protocols\CKD Nutrition guidelines stages 3-5 & Dx.pdf>
2. Nutrition in Chronic Renal Failure, Kidney Disease Outcomes Quality Initiative (NKF KDOQI)
<https://www.kidney.org/sites/default/files/docs/kdoqi2000nutritiongl.pdf>

7. Acute Kidney Injury (AKI)

Referral: Medical officer referral required; blanket referral if dialysis is required

Dietary Protocol:

	Anuric or oliguric phase	Recovery or polyuric phase
In General	<ul style="list-style-type: none"> <u>Non-Dialysed</u>: See dietary protocol for CKD stages 4-5 <u>Haemodialysis</u>: See dietary protocol for Haemodialysis <u>CVVHD</u>: refer to critical care protocol & dietitian 	<ul style="list-style-type: none"> Free diet or nutritional support if catabolism present +/- replacement of electrolytes and fluids from diet
Protein	<ul style="list-style-type: none"> <u>Non-dialysed</u>: 0.8g/kgIBW/d (maximum 1.0g/KgIBW/d) <u>Haemodialysis</u>: 1.2-1.5g/KgIBW/d depending on injury factors 	<ul style="list-style-type: none"> Free diet
Energy	<ul style="list-style-type: none"> Non protein calorie 20-30 kcal/d from Fat and CHO Higher energy intake if catabolism present <p>Adapted to individual needs in case of under-nutrition or overweight/obesity, ± injury factors</p>	<ul style="list-style-type: none"> Free diet <p>Adapted to individual needs in case of under-nutrition or overweight/obesity</p>
Sodium	<ul style="list-style-type: none"> ~ 60-80mmol/d 	<ul style="list-style-type: none"> no restriction or higher intake to replace urinary losses
Potassium	<ul style="list-style-type: none"> Restricted if hyperkalaemia present, 40-70mmol/d 	<ul style="list-style-type: none"> no restriction or higher intake to replace urinary losses
Phosphorus	<ul style="list-style-type: none"> <1000mg/d + phosphate binders 	<ul style="list-style-type: none"> no restriction or higher intake to replace urinary losses
Other Vitamins & Minerals	<ul style="list-style-type: none"> near RDI levels 	<ul style="list-style-type: none"> near RDI levels
Vitamins & Minerals (supplementation)	<ul style="list-style-type: none"> Vitamin B complex and Vitamin C and folic acid near the RDI levels Individualised Vitamin D, Iron and Calcium supplement by MO 	<ul style="list-style-type: none"> Free diet
Fluid	<p>UO + previous day losses + 500ml/d, depending on balance</p> <p>Allowance as per MO documentation</p>	<ul style="list-style-type: none"> no restriction or higher intake to replace urinary losses

Recommended intervention (usually inpatient):

- Close monitoring required depending on progress

Key reference:

- ESPEN Guidelines on Enteral Nutrition: Adult Renal Failure. Cano N et.al. Clinical Nutrition (2006) 25, 295–310. <http://espen.info/documents/enkidney.pdf>

8 Renal Transplantation

Referral: Blanket referral

Dietary Protocol:

Phase post-transplant	Immediate Post-Transplant or acute phase (about first 3 months or until immuno suppressants stabilised to maintenance dose)	Chronic Post-Transplant Phase (whilst on maintenance dose of immunosuppressants) is treated as CKD
In General	<ul style="list-style-type: none"> Pre-transplant diet (see haemodialysis or CAPD protocol) and protein and energy requirement <u>until graft functions</u> – see below Higher protein and energy requirements due to stress of surgery and steroids therapy Strict food safety practice in – line with Food standards of Australia & New Zealand 	<ul style="list-style-type: none"> Healthy and balanced eating as per Australian Dietary Guidelines
Protein	<ul style="list-style-type: none"> ~ 1.4g/kg IBW/d 	<ul style="list-style-type: none"> 0.75-1.0g/kg IBW/d (RDIs)
Energy	<p>Aim to attain and maintain IBW Depending on physical activity level</p> <ul style="list-style-type: none"> 30-48 kcal (120-200KJ)/kg IBW/d <p>Adapted to individual needs in case of under-nutrition or overweight/obesity, ± injury factors</p>	<p>Aim to attain and maintain IBW Depending on physical activity level</p> <ul style="list-style-type: none"> 35-45 Kcal (150-190KJ)/kg IBW/d for <60 years 30-35 Kcal (130-150KJ)/kg IBW/d for >60 years <p>Adapted to individual needs in case of under-nutrition or overweight/obesity</p>
Fat	<ul style="list-style-type: none"> ~30% total energy Encouraged mono- (up to 20% energy) and poly- (8-10% total energy) unsaturated fats Saturated fat <8% energy Cholesterol<300mg/d 	<ul style="list-style-type: none"> ~30% total energy Encouraged mono- (up to 20% energy) and poly- (8-10% total energy) unsaturated fats Saturated fat <8% energy Cholesterol<300mg/d
Sodium	<ul style="list-style-type: none"> Usually no restriction in patients with functional graft; may need to increase intake during polyuric phase 	<ul style="list-style-type: none"> Restricted if hypertension present, ~ 80mmol/d (no added salt)
Potassium	<ul style="list-style-type: none"> Usually no restriction in patients with functional graft, may need to increase intake during polyuric phase 	<ul style="list-style-type: none"> No modifications unless serum K is elevated

Dietary Protocols (continued):

Phase post-transplant	Immediate Post-Transplant or acute phase	Chronic Post-Transplant Phase
Calcium	<ul style="list-style-type: none">1200-1500mg/d	<ul style="list-style-type: none">RDI
Phosphorus	<ul style="list-style-type: none">1200-1500mg/d. may need phosphate supplementations if serum phosphate is low	<ul style="list-style-type: none">No modifications unless serum phosphate is elevated
Other Vitamins & Minerals:	<ul style="list-style-type: none">near RDI levels	<ul style="list-style-type: none">near RDI levels
Vitamins & Minerals (supplementation)	<ul style="list-style-type: none">Individualised supplementation by MO, e.g. iron, phosphate	<ul style="list-style-type: none">Individualised supplementation by MO if required
Fluid:	<ul style="list-style-type: none">usually high fluids intake is encouraged to maintain balance	<ul style="list-style-type: none">No modifications

Recommended intervention:

- Outpatient (minimum):
 - At least 5 hours in first 3 months post-transplant, then 2 hours per annum in established patients. More frequently if clinically indicated.
- Inpatient (in addition to usual nutrition care):
 - Screening for undernutrition should be performed weekly
 - Screening may need to occur more frequently if risk of undernutrition is increased (e.g. intercurrent illness)

KPIs:

- Acute phase: percentage of patients assessed by a renal dietitian (including SGA) within the first 3 months
- Chronic phase: percentage of patients assessed by a renal dietitian (including SGA) within the last 12 months

Key reference:

1. The Nutritional Management of Adult Kidney Transplant Recipients Summary of the Evidence-based Guidelines, 2010. [Clinical guidelines - transplantation\EBG Kidney Transplant Nutrition Summary for Dietitians Endorsed.pdf](#)
2. Evidence based practice guidelines for the Nutritional Management of Adult Kidney Transplant Recipients, Developed by the NSW Renal Services Network, Transplant working group, Greater Metropolitan Clinic Taskforce, 2009. [Clinical guidelines - transplantation\EBP TransplantNutrition Guidelines FINAL 2009.pdf](#)

9 Metabolic Disorders

Renal Related e.g. nephrolithiasis / kidney stones

Referral: Medical Officer referral required

Common Dietary Protocol:

- Maintain adequate energy intake (adapted to individual needs in case of under-nutrition or overweight/obesity) and a balanced intake of nutrients.
- **Fluid:** High and regular fluid intake, about 2.0-3.0 L/d, preferably WATER, to produce at least 2 litres urine per day to reduce urine supersaturation. Regular intake throughout the day, say second hourly. If suggested by the MO, drink enough fluid at bed-time to aim for nocturia, and to consume extra fluid after voiding.

1. Hypercalcuria / calcium stones

Calcium	Approximately 800mg/d (Australian RDI) <u>Remark:</u> Dietary calcium restriction is no longer found to be useful. A low calcium diet may lead to negative calcium balance.
Protein	Usually no dietary modification <u>Remark:</u> High protein intake : <ul style="list-style-type: none">• Increases urinary calcium excretion and thus calcium–oxalate supersaturation• Decreases urinary pH and favour uric acid precipitation <u>Recommended:</u> 0.75-1.0g/kg IBW/d (RDIs)
Sodium	Approximately 80mmol/d, i.e. no added salt
Fibre	High fibre diet, i.e. 30-40g fibre/d

2. Hyperoxaluria / Oxalate stones

Oxalate	Low Oxalate diet, i.e. 60-70mg oxalate/d
Calcium	Approximately 800mg/d (Aust. RDI) <u>Remark:</u> <ul style="list-style-type: none">• Dietary calcium restriction is <u>NOT</u> beneficial as it enhances oxalate absorption and excretion and will therefore increase urinary oxalate• Consume calcium and oxalate-rich foods together during a meal, this will increase GI binding & excretion of calcium–oxalate products
Protein	Usually no dietary modification <u>Remark:</u> High protein intake: <ul style="list-style-type: none">• Increases urinary calcium excretion and thus calcium–oxalate supersaturation• Decreases urinary pH and favour uric acid precipitation <u>Recommended:</u> 0.75-1.0g/kg IBW/d (RDIs)
Sodium	Approximately 80mmol/d, i.e. no added salt
Fibre	High fibre diet, i.e. 30-40g fibre/d
Vitamin C & D	Avoid supplementation
Pyridoxine	As prescribed by MO

3. Hyperuricosuria / Uric acid stones

Purine	Low purine diet
Protein	Optimal protein food intake to avoid excess purine intake Recommended: 0.75-1.0g/kg IBW/d (RDIs)
Energy	Aim to attain and maintain IBW Overweight patients require weight reduction
Sodium	Approximately 80mmol/d, i.e. no added salt
Alcohol	Limit alcoholic beverages or use sparingly

4. Cystinuria /Cystine stones

Protein	A low methionine diet is not applicable as it is restrictive and impractical
Sodium	Approximately 80mmol/d, i.e. no added salt

General reference:

1. Kopple J, Massry S and Kalantar-Zadeh K. Textbook of Nutritional Management of Renal Disease. Third Edition. Elsevier Publishing, 2013. Chapter 43: Nutritional prevention and treatment of kidney stones Authors: M Grieff and D Bushinsky.

10 Nutritional Support

Nutritional Support is required when poor nutritional status is indicated by:

- Unintentional loss of body weight, muscle wasting and loss of subcutaneous fat. This is known as Protein-Energy Wasting (PEW). **REMARK:** Low serum albumin is a strong predictor of adverse outcomes. However, albumin is an acute phase reactant, low albumin is often related to inflammation characterised by elevated C-reactive protein rather than poor nutritional status alone.
- Reduced spontaneous oral intake and nutritional requirements cannot be met by food and beverage consumption
- Increased in nutritional requirements, e.g. catabolism, wound healing, post-surgical stress, malabsorption and other injury factors etc.

First line of action to implement nutritional support is (1) nutrition counselling re optimal dietary intake from food and beverages, (2) food fortification and (3) oral nutrition supplementation. If all these attempts fail to meet requirements, liaise with MO for (4) enteral feeding.

For patient on haemodialysis, if nutrition requirements cannot be met or fail from all of the above treatments, liaise with the MO for Intradialytic Parenteral Nutrition (IDPN) if appropriate.

Suggested IDPN regimen:

To be infused evenly over the full duration of the haemodialysis session, NO rapid infusion over a short period.

*Product information:

- Synthamin 17: 50.0g amino acids per 500ml bottle of Synthamin 17:
http://www.baxterhealthcare.com.au/downloads/healthcare_professionals/cmi_pi/synthamin_pi.pdf
- Intralipid® 20%: The total caloric value, including fat, phospholipid and glycerin, is 2.0 kcal per ml of intralipid® 20%,
http://www.accessdata.fda.gov/drugsatfda_docs/label/2007/017643s072,018449s039lbl.pdf

Day 1

	Intralipid 20% 250ml (1/2 full std 500ml bottle)		Synthamin 17 500ml (full std 500ml bottle)		Total Kcal
	g	Kcal	g	Kcal	
Protein	0	0	53.0	213	213
Fat	~50	500	0	0	500
CHO	0	0	0	0	0
					663

Day two (if patient tolerates above regimen) and above

	Intralipid 20% 375ml (3/4 std 500ml bottle)		Synthamin 17 500ml (full std 500ml bottle)		Total Kcal
	g	Kcal	g	Kcal	
Protein	0	0	53.0	213	213
Fat	~ 75	750	0	0	675
CHO	0	0	0	0	0
					963

For patient with large body size, to meet requirements, then gradually increase Intralipid to no more than 500ml/session (if patient tolerates such regimen)

	Intralipid 20% 500ml (full std 500ml bottle)		Synthamin 17 500ml (full std 500ml bottle)		Total
	g	Kcal	g	Kcal	Kcal
Protein	0	0	53.0	213	213
Fat	~100	1000	0	0	1000
CHO	0	0	0	0	
					1213

Remark:

- To avoid “fat overload syndrome”, administering of 20% lipid formulation:
 - ~ 0.5 ml/min for the first 15 to 30 minutes of infusion, check signs of possible adverse reaction (dyspnea, cyanosis, allergic reactions, hyperlipidemia, hypercoagulability, nausea, vomiting, headache, flushing, increase in temperature, sweating, sleepiness, pain in the chest and back, slight pressure over the eyes, dizziness, and irritation at the site of infusion)
 - the infusion rate can be increased to 1 ml/min if no adverse reactions occur.
 - Maximum clearance rate of 20% lipid is 1 ml/min or 60 ml/hour
- Regular monitoring required (also refer to the nursing protocols):
 - Pre-dialysis blood:
 - Initial treatment and x 2 /week: electrolytes (K^+ , Ca^{2+} , PO_4^{2-} , Mg^{2+}), creatinine and urea
 - Initial treatment, then every 4-6 weeks: albumin, liver function tests, triglycerides and creatinine
 - During dialysis:, blood pressure, heart rate, temperature, blood glucose
 - Nutrition status:
 - Dry weight, SGA, dietary intake etc.as per usual practice

Key Reference:

1. Intradialytic Parenteral Nutrition (IDPN) Guidelines, Created March 2008, Last Updated September 2014, Created by: Intradialytic Parenteral Nutrition Working Group, British Columbia Renal group.
<http://www.bcrenalagency.ca/documents/intradialytic-parenteral-nutrition-guidelines>

11 Renal Diagnostic Test Diet

These diets are seldom ordered, but is available on eMR for inpatient

Urine Test	Test Diet (and some medications)
5HIAA - 5-hydroxyindoleacetic acid	Avoid foods high in 5HIAA and its precursor, serotonin for 48 hours and during collections Bananas, avocados, plums, honeydew melon, dates, hickory nuts, grapefruit, kiwi, eggplant, tomatoes, pineapples, walnuts, plantain
Catecholamines	Avoid strenuous exercise as well as alcohol, caffeine and vitamin B for 24 hours and during collection
Renin Study	No special diet
Vanillylmandelic acid (VMA)	Avoid phenolic amines, found in fruit juices and bananas for 24 hours and during collection

Others:

Urine Test	Test Diet (and some medications)
Renin Study	No special diet

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2. The National Kidney Foundation Kidney Disease Outcomes Quality Initiative (NKF KDOQI™) guidelines, <https://www.kidney.org/sites/default/files/docs/kdoqi2000nutritiongl.pdf>
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<http://www.nejm.org/doi/full/10.1056/NEJM200101043440101>
3. Toledo E et.al Effect of the Mediterranean diet on blood pressure in the PREDIMED trial: results from a randomized controlled trial. BMC Med. 2013 Sep 19;11:207
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3849640/>
4. Australian Dietary Guidelines, NM&MRC 2013: <https://www.nhmrc.gov.au/guidelines-publications/n55> and summary: https://www.nhmrc.gov.au/files/nhmrc/publications/attachments/n55a_australian_dietary_guidelines_summary_131014.pdf

Chronic Kidney Disease stages 1-3

1. Johnson DW, Atai E, Chan M, Phoon RKS, Scott C, Tussaint N, Turner GI, Usherwood T, and Wiggins, K. KHA-CARI guideline: Early chronic kidney disease: detection, prevention and management. *Nephrology* 18 (2013) 340–350.
http://www.cari.org.au/CKD/CKD%20early/Summaries/Johnson_2013_340.pdf
2. Modification of lifestyle and nutrition interventions for management of early chronic kidney disease
http://www.cari.org.au/CKD/CKD%20early/Modification_of_Lifestyle_Nutrition_ECKD.pdf

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1. Evidence based practice guidelines for the nutritional management of chronic kidney disease. Nutrition & Dietetics, 2006; 63 (Suppl. 2):S35–S45.
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